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Economic Research Aid

PARTICIPATION OF THE ROLLING STOCK INDUSTRY IN THE GUIDED MISSILE PROGRAM OF THE USSR

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CENTRAL INTELLIGENCE AGENCY

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FOREWORD

This research aid presents an analysis based on all available sources of information of possible production by the Soviet rolling stock industry of cars to transport guided missiles or of trains for the guided missile program of the USSR. The research aid is not intended to review the intelligence on the actual transportation of missiles but only to examine the rolling stock industry of the USSR for indications of production in direct support of the Soviet guided missile program.

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PARTICIPATION OF THE ROLLING STOCK INDUSTRY IN THE GUIDED MISSILE PROGRAM OF THE USSR*

Summary

Although the manner of deploying the Soviet intercontinental ballistic missile (ICBM) and other long-range ballistic missile systems is not known, it is likely that the railroad network of the USSR provides the main logistic support for these missile systems. This support includes transportation of the missiles from production facilities to test ranges, as well as delivery of operational missiles from production facilities to central storage or checkout facilities for missiles and related equipment in the area in which the missiles are to be deployed. The rail support also may include delivery of the missiles from the central facilities to the actual launching complexes. (For purposes of this research aid, a system using the railroad network in the missile program solely for transportation purposes, as described above, will be referred to as a "rail-supported system.") It also is possible that the USSR has developed a mobile launching system for its ICBM employing a special train both to transport the guided missile to previously selected launching points and to participate directly in the actual launching, either from a launching car or a fixed pad, with special railroad cars containing some or all of the necessary supporting equipment comprising the operational missile system (a rail-served or rail-mobile system).

The role of the railroad network in support of the Soviet long-range missile program undoubtedly has created a requirement for production of special-purpose missile transporters and possibly other special railroad equipment. An examination, however, of all available sources of information on plants of the locomotive and railroad car industry, summarized in this research aid, has failed to disclose evidence pointing to production of special railroad equipment either for logistic support of the program or for the creation of guided missile trains. Nevertheless, the USSR could obtain most of the rolling stock** necessary for the composition of missile trains from current production or from available inventory of railroad equipment. Furthermore, it must be recognized that most special-purpose equipment for either a rail-supported or a rail-served system could be

* The estimates and conclusions in this research aid represent the best judgment of this Office as of 1 November 1960.

** The term rolling stock as used in this research aid includes locomotives.

converted readily from standard rolling stock in any of the numerous railroad equipment repair and modification yards throughout the USSR. These facilities have not been examined in the course of this research aid.

Special-purpose railroad cars individually, and as part of an "unusual" train, have been sighted in the USSR, but special-purpose cars have many uses not necessarily connected with the guided missile program. There are indications that some types of special-purpose cars seen at certain locations in the USSR are connected with the missile program, but in most cases where "unusual" trains have been reported, the evidence does not establish a firm association with missile activity.

During 1948-59, approximately 14 plants of the Soviet rolling stock industry produced, in addition to other commodities, 12,005 locomotives and 418,403 freight cars for the mainline railroads of the USSR. Production of locomotives began to decline in 1950 and that of freight cars in 1951, and the decline continued until about 1953. Although there has been speculation that production of special equipment for use in the guided missile program took place in the industry during 1950-53, evidence on this point is lacking. The Soviet rolling stock industry probably could easily supply a rail-supported or a rail-served deployment system for the ICBM, if reasonably scheduled over a period of years, but no evidence has been noted through 1959 that a production program for rolling stock in support of either system has been underway in the USSR.

25X1B

[redacted]

I. Rolling Stock Used in a Guided Missile Program

A. Introduction

25X1C [redacted], no determination can be made on the operational concept adopted by the USSR for launching ICBM's. Although railroads are considered to be the main means of logistic support, the extent to which rail lines and equipment are used in the immediate operational area is still unknown. This lack of data allows the possibility of at least two alternate systems of operation, as follows: (1) a rail-served system and (2) a rail-supported system. The following sections discuss some of the aspects of this problem that might affect the Soviet rolling stock industry.

B. Guided Missile Trains

A hypothetical guided missile train would be composed of locomotives and railroad cars necessary for the transportation and independent launching of a guided missile or missiles. For purposes of illustration, an estimate of the numbers and types of locomotives and railroad cars required for such a train is shown in Table 1.* A typical guided missile train capable of launching three missiles might consist of about 35 units, and much of the equipment would not differ from that used in normal railroad transport in the USSR. For example, the diesel-electric locomotive probably would be the same type used to haul other trains. The tank cars and flat cars could be the same types used in ordinary freight transport, and the dining and sleeping cars would be the same as those used in normal passenger trains. All of this equipment is being produced currently in the USSR or is available from the current inventory of the Soviet railroads.

Probably only a few cars of a missile train would require special design and construction. Two such cars would be the missile transporter-erector-launcher car and the missile-carrying car for transporting a second (or parallel) stage if required. These cars probably would be specially designed to protect the missile from shock, to support it firmly during transport, and to carry out the erection-launching operation. Although this requirement could necessitate the design and construction of entirely new railroad cars, such cars also could be modifications or conversions of existing rolling stock. In any event, either of these cars probably could be so constructed as to appear to be a standard Soviet railroad car.**

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* Appendix A, p. 22, below.

** The US is experimenting with the transport of guided missiles in ordinary 21-meter (70-foot) baggage cars -- apparently with success. See Figures 1 and 2, Appendix B, p. 41, /footnote continued on p. 4/

A few of the cars, such as the launch control and command cars, could be obtained from present production or inventory but would require alterations or changes in specifications for the installation within the body of the cars of equipment for electronic control, fuel transfer, and other specialized uses. A rail-served ICBM system incorporating all the necessary components for launching up to three missiles with an all-inertial guidance system also is considered feasible and would require fewer cars.

C. Guided Missile Railroad Cars

A guided missile railroad car, as distinguished from a guided missile train, may be defined as any railroad car that transports a guided missile, or an integral part of a missile, such as a booster section, an engine, or a nose cone. Under this definition, guided missile railroad cars may be as follows: (1) cars that have been specially designed and constructed, (2) cars of regular production that have been adapted for special use, or (3) ordinary railroad cars that are used temporarily as guided missile cars. Cars of the first type may include those with special equipment for shock and vibration control to reduce potential damage to cargo. Cars of the second type* would be equipped with special roofs or extensions of the kind seen at the Scientific Research Institute (Nauchno-Issledovatel'skiy Institut -- NII) No. 88 Soviet guided missile complex in Kaliningrad (55°55' N - 37°49' E). Cars of the third type might include "transporters" or "flatcars" normally used for the transport of goods and equipment not connected with the Soviet missile program.

In addition to the missile-carrying cars, other types of railroad cars that probably would be used to support a missile program include cars for transporting liquid oxygen (LOX), tank cars, and so on. These cars, however, are not included as guided missile cars in the definition given above, but their production for specific military customers or their association with suspected installations may indicate missile activity.

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below. A proposed US missile launcher concealed in an ordinary-appearing boxcar is shown in Figures 3 and 4, Appendix B, pp. 43 and 45, respectively, below.

* For a discussion of these cars, see II, A, p. 5, below.

II. Observation of Possible Guided Missile Trains and Guided Missile Railroad Cars in the USSR

A. Sightings of Typical Trains

25X1C [redacted] in the USSR. [redacted] as 25X1C being present in the USSR in October to December 1947. This train may have carried all equipment and instruments for the preparation and launching of a V-2 type of missile.** The train was said to have had 100 axles.*** The FMS train included a passenger car, a first-aid car, a laboratory car, and a kitchen car, as well as cars for transporting the missile and some of the ground support equipment. 2/ The FMS train was used by Soviet scientists in support of their early V-2 (A-4) missile firing tests in 1947-48 at the Kapustin Yar test range. Since that time, individual railroad cars, said to have been part of these trains, reportedly have been seen in various locations in the USSR.

There is no information indicating whether or not Soviet missile experts put together their own version of the FMS train or whether they continued to use the German train after the early years at Kapustin Yar. [redacted] other 25X1C types of guided missile trains in the USSR, an analysis of most of their reports makes it clear that the majority of the trains sighted probably were not missile trains but more likely were other types of special-purpose trains such as refrigerator trains or electric power trains.†

B. Sightings of Special Cars

There have been, however, [redacted] of 25X1C individual railroad cars suspected of being missile carriers, especially cars seen outside plants or buildings believed to have been

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* FMS is the abbreviation for Fahrbare Meteorologische Station (mobile meteorological station), the German cover designation for a rocket-launching train.

** This statement is qualified [redacted] 25X1C that none of the range equipment was operated directly from the FMS train. 1/ (For serially numbered source references, see Appendix E.) The trains were used only as quarters for some of the personnel and as laboratories.

*** Because the usual modern railroad car has four axles, this statement means that the train would have consisted of approximately 25 cars.

† A refrigerator train may consist of up to 23 cars of a uniform color of which 20 cars are four-axle /footnote continued on p. 6/

connected with the Soviet guided missile program. The appearance of special-purpose railroad cars does not necessarily mean that a car is connected with production or transport of missiles, for such cars are used for the transport of many other types of items. Figures 13 through 17* show some US special-purpose cars and their uses.

25X1C From time to time, special-purpose cars of various types have [redacted] a known Soviet developmental center for missiles.** These cars include a Soviet gondola with one end extended, a gondola with both ends extended, and some that appear to be passenger cars with no doors or windows first reported in 1954.

25X1C [redacted]

especially for the transport of Soviet short-range (up to 350 nautical miles -- nm) missiles developed during this period. The numbers appearing on these cars indicate that many of them were available to the USSR by 1952. The purpose of the "windowless passenger cars" is not clear, but the timing of the first observation and the length of the car suggest that they may have been designed to transport the Soviet medium-range (700 nm) missile developed in the mid-1950's. Cars of

25X1C [redacted]

but it is not possible to estimate how many have been produced or to associate these cars exclusively with the missile program.

25X1C [redacted]

refrigerator cars and 3 are special cars -- a service car, a car containing cooling equipment, and a car containing diesel-electric equipment. The first such Soviet train was built in the USSR during the Fifth Five Year Plan (1951-55). See Figures 5 through 12, Appendix B, pp. 45 through 53, below. Similar units have been constructed by the German Democratic Republic, and 14 of these trains were exported to the USSR during 1958. Electric power generating trains are discussed in III, D, 2, p. 12, below.

* Appendix B, pp. 53 through 57, below.
** For one type of special-purpose car, see Figures 18 and 19, Appendix B, p. 59, below, and source 3/.
*** Appendix B, pp. 61 through 65, below. LOX cars undoubtedly are used for transportation of oxygen for /footnote continued on p. 7/

25X1C [redacted]

C. Types, Color Coding, and Identification Marking of Soviet Railroad Cars

Table 5* lists most of the known types of Soviet railroad cars, their capacity in tons,** and their length and width. With the use of Table 5 and the information in Table 1,*** which shows the hypothetical composition of a missile train, it may be possible to determine which cars could be and are likely to be adapted for transporting missiles. Photographs and sketches of US and Soviet cars of the types which might be used or which might be confused with cars for transporting guided missiles are presented in Appendix B. This material has aided in evaluating the reported sightings of cars believed to be transporting guided missiles and discussed in the preceeding section of this research aid.

Soviet regulations require that the time and place of construction must be clearly indicated on the exteriors of all railroad cars.† 14/ Unfortunately, [redacted] 25X1C suspected of carrying guided missiles have failed to record the time and place of construction of any suspected car.

Soviet practice provides a system of color coding and standard markings for the ready identification of cars carrying specialized materials that may be dangerous or require special handling. Table 4†† shows the requirements for color and markings that have been identified,

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purposes other than guided missile propulsion. LOX is used, for example, in production of explosives. Oxygen is often transported in liquid form when the distances and amounts involved would make its transport in a gaseous form much more expensive. Gaseous oxygen is used industrially in steel plants, in fusion welding and cutting of metals, and as an oxidant. It is also used in high-altitude flying (which would explain the presence of LOX cars in the vicinity of airfields) and as an admixture with nitrous oxide, ether, and other anesthetics.

* Appendix A, p. 32, below.
** Tonnages are given in metric tons throughout this research aid.
*** Appendix A, p. 22, below.
† For an example, see Figure 42, Appendix B, p. 83, below.
†† Appendix A, p. 26, below.

and other combinations, not yet identified, may be in use. No color or markings of guided missile cars have been identified, but it may be significant that many of the cars sighted which were suspected of carrying guided missiles or of activities related to the guided missile program [redacted] As shown in Table 4, green is the color used to designate cars that belong to organizations other than the Ministry of Railroads and that are permitted to circulate on the general railroad system. Green cars are required to carry the same inscriptions as all other cars except for the seal of the ministry and the road of registration. As much of the material that might be carried in a guided missile train is flammable or sensitive to shock, some or all of the cars in such a train might carry the inscriptions Огнеопасно (Ogneopasno -- flammable), Не спускать с горки (Ne spuskat' s gorki -- do not hump), Не толкать (Ne tolkat' -- do not jar), and so on.

25X1C

From the foregoing information on size, color, and markings, it may be concluded tentatively that, when finally identified, the missile-carrying car or the transporter-erector-launcher car -- at least for the larger missiles -- will be (1) of greater height, width, or length than the standard car which it may be built to represent; (2) painted green itself or in a train with a high proportion of green cars; and (3) marked with an admonitory inscription for safe handling along with several of the other cars in the train.

A guided missile train probably would be a "mixed" train -- that is, one which includes both freight and passenger cars. A "mixed" train would be unusual in the USSR, for current Soviet practice is to run either all-freight or all-passenger trains.

III. Survey of the Rolling Stock Industry for Possible Production of Special Railroad Equipment for the Guided Missile Program

A. General

The Soviet rolling stock industry consists of approximately 14 plants, most of which are located west of the Urals. The industry produces locomotives and railroad cars of many types and gauges,* and most of the plants produce other types of goods as well. Generally, each plant is composed of several buildings covering a large area. Most of the buildings have high ceilings and contain much heavy equipment and cranes of large capacity. These features make

* Unless otherwise indicated, the equipment discussed in this research aid is for the mainline broad-gauge (5 feet 0 inches) railroad.

it relatively easy to convert the plants to production of other civilian goods and military equipment. Much of the assembly of locomotives, railroad cars, and their subunits takes place on conveyor lines, and most models of locomotives and railroad cars, once having been tested and accepted for production, are serially produced. For example, a new tank car, recently accepted for production, was produced in a "batch" (partiya) of several thousand units. This type of production permits the USSR to take advantage of the economies possible in producing large quantities.

During 1948-59 the Soviet rolling stock industry produced 12,005 locomotives and 418,403 freight cars, as well as other commodities. 5/ Production of locomotives declined during 1949-52 and then rose until 1955. From 1950-52, there was a similar decline in production of freight cars, after which production rose almost continually until 1957.* An analysis of production of the rolling stock plants during this period indicates that part of this decrease in production can be explained. Many of the plants were engaged in production of equipment other than that for railroads, such as agricultural machines, equipment for tractor and agricultural machine building plants, and equipment for the "great projects of Communism" -- for example, the Volga-Don Canal.** This production, however, apparently cannot completely account for the great decline in production of rolling stock. Possibly, some of these plants were engaged in producing military end items. Also, possibly, raw and intermediate materials were reallocated from production of railroad equipment to some other industry or to state reserves.

B. Trends in the Industry Since 1945

1. Locomotives***

Production of locomotives after World War II was resumed slowly with a total of eight units in 1945 and increased rapidly until 1950, when it began to decline. Production reached its postwar low in 1952, when 439 locomotives were produced, after which it rose until 1955 and then began to drop because of a reduction in production of steam locomotives. Production of steam locomotives was ended in 1956. Production of diesel locomotives has increased

* For production of locomotives and freight cars, see Table 3, Appendix A, p. 25, below.

** See Table 2, Appendix A, p. 23, below.

*** Details on production of locomotives for 1945-58 have been covered in a recent report 6/ and will not be repeated in this research aid except when necessary to the subject under discussion.

continually since the low point in 1952, and production of electric locomotives has risen constantly since World War II, except for 1952, when it was three units lower than the preceding year. Plans call for increased production of diesel and electric locomotives, so that by 1970 all mainline railroads will be serviced by diesel and electric locomotives.

2. Railroad Cars

Postwar production of freight cars has paralleled the general pattern of producing locomotives -- a rapid increase from 1945 through 1950, a sharp drop in 1951, and continued low production through 1954, after which production rose again.

Production of passenger cars has increased slowly during every year since World War II, except for 1952, when it was about 100 units below production for 1951. Except in special instances, production of passenger cars will not be considered further in this research aid.

The trend in the design and production of railroad cars has been toward increasing the capacity and volume of the cars and at the same time reducing their weight when empty.

C. Soviet Capability to Supply Rolling Stock

Based on the known capacity of the Soviet rolling stock industry and the reasonable peacetime requirements of the rail transportation system of the USSR, it is believed that the Soviet industry could easily supply the necessary railroad equipment for transporting ICBM's and other long-range missile systems to deployment centers or for organizing a relatively large number of guided missile trains. The plant capacity and vehicle inventory are such that, for example, if a decision were made to place several hundred guided missile trains on the railroads, the rolling stock probably could be made available within 2 years, without allowance for the time necessary for complete installation and checkout of the complex support equipment. If normal retirements of present railroad equipment were postponed, it might be possible, by using a combination of present equipment and new production, to supply all the rolling stock necessary for several hundred such trains within 6 months to 1 year. Railroad equipment for more limited programs or for a rail-supported program requiring relatively few special-purpose cars for logistic support of missile launching sites could be much more easily supplied, and its production would be even more difficult to detect.

D. Survey of Individual Production Facilities

1. Introduction

The known size of the testing program for ballistic missiles in the USSR alone indicates that there must be a fairly extensive and regular movement of rail transporters over the Soviet railroad network. [redacted] 25X1C

25X1C [redacted]

For example, the lists of the products of the various plants probably do not include items such as consumer goods, which the plants produce. Furthermore, information is incomplete regarding production of certain plants over an extended period of time, but this lack may mean only that no new designs were introduced; that no new models were tested; and that there were no difficulties, increases, or changes in production, which warranted mention in any of the available sources.

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* See also Appendixes C and E.

** Although there are plants in the European Satellites that are capable of producing various types of railroad equipment, it is unlikely, for security reasons, that special railroad equipment for the Soviet missile program would be produced outside the USSR.

*** See Appendix C.

A brief resume of the history of production of the 14 Soviet rolling stock plants follows. No Western observers are known to have visited the plants in recent years unless otherwise indicated below.

2. Bryansk Machine Building Plant imeni Krasnyy Profintern*

The Bryansk Machine Building Plant imeni Krasnyy Profintern in Bryansk (53°15' N - 34°20' E) began production of steam locomotives in 1890. It was evacuated during World War II, was reconstructed after 1943 to produce steam locomotives, and built its first postwar steam locomotive in 1947. In 1949 it began production of refrigerator cars and has produced other types of freight cars and mobile powerplants. This plant has designed tank cars to carry gas, alcohol, milk, nitric acid, highly viscous products, and latex. In 1955 it was reportedly engaged in production of parts of the TE-3 mainline diesel locomotive, but it is not itself assembling mainline diesel locomotives. In addition to railroad equipment, the plant has produced iron beds, aluminum pots, wires and insulators for radios, bearings for earth-moving machines, tractor parts, and rolled metal and pig iron for the Volga-Don Canal. In 1952 the plant began to produce steam turbines with capacities of 12,000 kilowatts (kw) and 25,000 kw and currently produces approximately 4 percent of the steam turbines in the USSR.

In April 1954 the plant at Bryansk completed its first electric power train. This train developed 4,000 kw and consisted of 13 cars of the following types**:

1 turbine	1 living
1 auxiliary equipment	1 service
1 electric distributing	3 boiler
1 shop	4 cooling tower

The unusual characteristics of some of the cars, especially the "cooling tower" cars, of this type of power train have attracted the attention of many observers. (In at least one report these "cooling tower" cars were said to have been "probable atomic

* This plant has been given such names as the Bryansk Locomotive Plant, the Bryansk Diesel Locomotive Plant, and the Bryansk Transport Machinery Plant.

** See Figures 26 and 27, Appendix B, p. 67, below. Additional photographs of railroad cars and/or railroad equipment are shown in Figures 28 through 48, Appendix B, pp. 69 through 89, below.

locomotives.") Reports often link this type of power train to the guided missile program. 7/ The large number of cars in the coal-fueled steam-generating power train makes its use as a source of power in a rail-mobile missile system unlikely, because it would contain from 8 to 13 cars in addition to a locomotive and would require a large volume of fuel to generate power. A more likely source of power for a rail-mobile missile system would be the diesel-electric powerplant built by the Kolomna Diesel Locomotive Plant in 1958.* Two of these powerplants would require only four railroad cars in which to develop more than 4,000 kw.

In 1958-59 the plant in Bryansk was known to have been producing power trains, automatic and self-unloading railroad cars, steam turbines, and 1,000-horsepower (hp) diesel shunting locomotives.

3. Altay Railroad Car Building Plant

The Altay Railroad Car Building Plant, located in Chesnokovka (53°25' N - 83°56' E) near Barnaul, was built during World War II and began production of freight cars in 1945. The plant has specialized in flatcars, gondolas, and boxcars and has produced narrow-gauge equipment. In 1955 it produced about 1,376 cars, or about 4 percent of all the freight cars produced in the USSR. The plant has produced also spare parts for S-80 tractors, and in 1954 it produced agricultural implements worth 6 million rubles.**

In 1958 the Altay plant was known to have produced cattle cars, boxcars with a capacity of 120 cubic meters (cu m) (about 4,200 cubic feet -- cu ft), flatcars, and 12-axle transporters for narrow-gauge lines. During 1959-65 the plant plans to mass-produce boxcars with a capacity of 120 cu m (about 4,200 cu ft), to double its production of mainline railroad cars, and to triple its production of narrow-gauge flatcars.

4. Dneprodzerzhinsk Railroad Car Building Plant imeni Gazety Pravda

The Dneprodzerzhinsk Railroad Car Building Plant imeni Gazety Pravda in Dneprodzerzhinsk (48°30' N - 34°37' E) was constructed before World War II and has produced primarily flatcars, gondolas, hoppers, and boxcars, as well as "carriages" for agricultural combines.

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* See Figure 28, Appendix B, p. 69, below.

** Ruble values in this research aid are given in current rubles and may be converted to US dollars at a rate of exchange of 4 rubles to US $1. This rate does not necessarily reflect the value of rubles in terms of dollars.

In 1958-59 it was known to have produced flatcars with a capacity of 60 tons, dumpcars, and ingot cars with a capacity of 120 tons.

5. Kalinin Railroad Car Building Plant

The Kalinin Railroad Car Building Plant in Kalinin (56°50' N - 35°55' E), which had been built before World War I, was damaged during World War II. By 1946, reconstruction had begun, and the plant was producing 1.5 flatcars per day. The plant remained primarily a producer of flatcars until 1951, when it began to specialize in passenger cars. In addition to freight and passenger cars, the plant has produced electric motors and equipment for the oil industry. In 1958 and 1959 it produced all-metal passenger cars and the first air-conditioned train in the USSR.

6. Kaliningrad Railroad Car Building Plant

The Kaliningrad Railroad Car Building Plant in Kaliningrad (formerly Koenigsberg -- 54°45' N - 20°30' E) has produced chiefly dumpcars, cars for the metallurgical and mining industries, and fork-lift trucks. Also a producer of consumer goods, the plant in 1954 exceeded the goal set for it in such products by more than half a million rubles. Known production in 1958 included hot sinter cars with a capacity of 80 tons; dumpcars with a capacity of 90 tons; fork-lift trucks powered with batteries; and the chief commodity, dumpcars with a capacity of 50 tons.

7. Khar'kov Transport Machine Building Plant imeni V.A. Malyshev

The V.A. Malyshev Transport Machine Building Plant, located at Khar'kov (50°00' N - 36°15' E), has produced Soviet locomotives since 1895 and has been producing diesel locomotives since 1947. At one time the plant was engaged in designing a gas-turbine locomotive and may be producing T-54 tanks. Present production consists of diesel locomotives and diesel engines for the locomotives produced at Lugansk.

8. Kolomna Diesel Locomotive Plant imeni Kuybyshev

The Kolomna Diesel Locomotive Plant imeni Kuybyshev in Kolomna (55°05' N - 38°45' E) has been producing locomotives continuously since 1869 (with the exception of war years) and has produced more than 10,400 locomotives. Kolomna has been and still is the most important producer of diesel engines for the Soviet Navy.

At present the plant is engaged in the design and production of diesel locomotives and recently produced the first gas-turbine locomotives in the USSR. It also has produced mobile electric powerplants -- for example, a 1,050-kw unit in a single railroad car.

9. Kryukov Railroad Car Building Plant

The Kryukov Railroad Car Building Plant in Kryukov (49°02' N - 33°26' E) has produced freight cars since before World War II, specializing primarily in gondolas but also producing dumpcars and flatcars. This plant is one of the few railroad car building plants in the USSR that, during 1949-56, apparently did not produce significant amounts of equipment other than that for railroads.

In 1958 the plant in Kryukov is known to have produced dumpcars with capacities of 60 tons and 93 tons; flatcars with capacities of 62 tons, 65 tons, 100 tons, and 105 tons; and consumer goods, such as bedsteads.

10. Leningrad Railroad Car Building Plant imeni Yegorov

The Leningrad Railroad Car Building Plant imeni Yegorov in Leningrad (59°55' N - 30°15' E) produced tanks during World War II and railroad cars both before and after the war. The plant specializes in production of passenger cars and built the 10,000th car in 1949. In 1950-52 it produced tractor parts, beds, folding stools, and so on, in addition to railroad cars. In 1958 it was reported to have "resumed manufacture of furniture for our population" and to be producing passenger cars. There is no information on production of railroad equipment at this plant during 1959.

11. Lugansk Diesel Locomotive Building Plant imeni October Revolution

The Lugansk Diesel Locomotive Building Plant imeni October Revolution in Lugansk* (48°34' N - 39°20' E) was built before 1900 and has produced more than 80 percent of all steam locomotives built in the USSR. The plant also has produced large freight cars and, during the war at least, tanks. In 1951 the plant designed and since 1955 has been building railroad transporters** with capacities of from 200 to 250 tons. In addition, the Lugansk plant has produced other equipment.

* At one time called Voroshilovgrad.

** Sometimes called "deep-well" cars, these cars are used for the transport of heavy machinery, such as steam turbines or generators for electric powerplants.

In 1951-52 the plant produced cogwheels, gearwheels, rollers, sectional rolled metal, and -- for the Volga-Don Canal and the "great projects of Communism" -- spare parts for bulldozers, scrapers, and excavators. From 1954-57 it produced parts for tractors and agricultural equipment and consumer goods. By 1955 the plant was installing new equipment and assembly lines for diesel locomotives, which it now produces. In 1960 the plant at Lugansk is to produce 55 percent of all diesel locomotives in the USSR. Known production in 1958-59 included the 2,000-hp TE-3 mainline diesel locomotive, the 1,500-hp TG-100 mainline diesel-hydraulic locomotive, a 750-hp diesel-hydraulic shunting locomotive, and transporters. The plant is engaged presently in the design and production of a gas-turbine locomotive and lately has begun to fabricate heat exchangers for chemical plants. Western observers visited the plant in June 1960, and at that time the director reported that the plant employed 23,000 people.

12. Tbilisi Electric Locomotive Building Plant

The Tbilisi Electric Locomotive Building Plant in Tbilisi (41°42' N - 44°45' E) is the former locomotive repair plant of the Soviet Ministry of Transportation, which was converted in 1957 to production of electric locomotives. The plant produced its first electric locomotive at the end of 1957 and is scheduled to produce 100 N-8 electric locomotives by the end of 1960. Western observers who visited the plant in 1960 reported that the plant employed 2,500 workers.

13. Urals Railroad Car Building Plant*

The Urals Railroad Car Building Plant in Nizhniy Tagil (57°54' N - 60°00' E), the largest railroad car building plant in the USSR, turned out its first products in 1935. In 1939 its plan called for "full capacity" of 42,000 four-axle cars to be reached 3 years later, on the basis of two shifts. During World War II the plant produced military tanks and had turned out its 35,000th tank by April 1946. [redacted] that pro- 25X1C
duction of tanks had ended as early as 1946, [redacted] that 25X1C
such production continued at least through 1949. At that time, prac-
tically all POW's were removed from the area. [redacted] 25X1C
tanks were produced there in 1952, [redacted] that none were 25X1C
produced there in 1953. Reports of production of tanks at the Urals Railroad Car Building Plant after 1953 are practically nonexistent.**

* A detailed description of this plant is given in source 8/.

25X1B ** [redacted] produced in Nizhniy Tagil suggest their possible production at the Urals /footnote continued on p. 17/

In 1951 the plant began, in addition to its chief production, production of dredge parts, units for petroleum installations, and automatic machinery for peat mulching pots. This type of production continued at least through 1954, when the plant sent 11,500 cultivator-hillers for row-crop cultivation to the machine tractor stations. Most of the present production of the plant seems to consist of gondolas and of experimental batches of "Universal" freight cars.

A "Universal" freight car may be used as a boxcar (with the roof sections closed) or as a gondola (with the top open). This car, approximately 14 meters (46 feet) long with a capacity of 57 tons, is suitable for carrying a wide variety of freight. The gondolas produced by the Urals plant are similar to those produced in the US and have carrying capacities of up to 100 tons. The plant intends to mass-produce, during 1959-65, metal gondolas having six axles and a capacity of 100 tons.

14. Zhdanov Heavy Machine Building Plant imeni Il'ich

The Zhdanov Heavy Machine Building Plant imeni Il'ich in Zhdanov (48°09' N - 38°16' E) is the chief producer in the USSR of railroad tank cars. The installation has designed cars for the transport of chlorine, liquefied gases, and liquefied propane and from 1945 to 1957 produced 50,000 such cars.* Known production of the plant in 1958-59 was tank cars with capacities of up to 60 tons.

15. Novocherkassk Electric Locomotive Building Plant imeni Budennyy

The Novocherkassk Electric Locomotive Building Plant imeni Budennyy in Novocherkassk (47°24' N - 40°06' E) was constructed in 1946-47 on the site of a half-destroyed shop for the repair of steam locomotives. In April 1947 the plant produced its first mainline electric locomotive and since then has been producing this type of

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Tank Plant No. 183, said to have been part of the Urals Railroad Car Building Plant, at least through 1955. 9/ The line producing tanks, however, is physically separated from the lines producing railroad cars. One analyst of the Soviet tank industry asserts that "the plant producing tanks ... is for all intents and purposes a separate entity with its own management, labor force, equipment, and supply system." 11/ The evidence on this point is not conclusive.

* Total Soviet production of tank cars during 1945-55 was 37,534 units. (Figures for production of tank cars for 1956-57 are not available.) The figure of 50,000 may include some tank cars for narrow-gauge railroads.

locomotive. From the end of World War II until the end of 1957 this plant was the only installation producing mainline electric locomotives in the USSR. In addition, the plant has produced industrial locomotives, consumer goods, and parts for agricultural machinery. The plant recently was expanded. Western observers visited the plant during 1960, at which time it was producing VL-23, N-8, and N-60 electric locomotives.

D. Designing

Designing of locomotives and railroad cars is carried out in the design offices of the individual plants. These offices may call on scientific institutes, universities, and individuals for assistance in solving problems demanding specialized knowledge. Each plant has its own design office, and the offices of two or more plants may be simultaneously engaged in designing almost identical equipment. (A recent example of such an effort is the design of gas-turbine locomotives at both the Kolomna and Lugansk Diesel Locomotive Building Plants.) The design office draws up technical plans for the new equipment, and these plans must be approved by the Technical Council of the Ministry of Railroads before production of the prototype can begin.

After the technical plans have been approved, the plant then constructs the prototype, testing subassemblies (for example, engines, trucks, and so on) whenever necessary before installation in the prototype. The finished prototype is then turned over to the All-Union Scientific Research Institute of Railroad Transport for testing. This institute tests the prototype and makes recommendations as to its disposition. The equipment may be disapproved for production, returned to the plant for further improvements, or recommended for production.

IV. Possible Producers of Rolling Stock for the Soviet Guided Missile Program

Although no evidence supports this suggestion, missile cars, for various purposes, could be produced at the following plants in the Soviet railroad equipment industry:

Type	Place	Reason
Transporter-erector-launcher cars	Lugansk	Experience in building large-size transporters
	Nizhniy Tagil	Largest Soviet car building plant, which recently has gone into production of large railroad cars
	Dneprodzerzhinsk Kryukov	Long experience in production of flatcars
Locomotive	Khar'kov Kolomna Voroshilovgrad	Normal production of plant
Tank cars	Zhdanov	Typical production
Sleeping and dining cars	Kalinin Leningrad	Typical production
Specialized freight cars	Lugansk	Physical facilities and experience in producing railroad cars and locomotives
Power cars	Bryansk	Normal production of plant

From the list of railroad equipment considered necessary for the composition of a Soviet guided missile train,* it is evident that most of the rolling stock, such as locomotives, power-generator cars, sleepers, and tank cars, is already available in the inventory of the Soviet railroads or is currently in production. This statement probably also is true of other cars such as the launch control and command cars, although these cars might require alterations or changes in specifications. It is likely that missile-related railroad equipment would be produced in the plants currently engaged in production of such equipment; as such a procedure would be the most economical means of producing this equipment.

The only cars likely to require special basic designs and construction are the missile transporter-erector-launcher car and the missile-carrying car. The transporter-erector-launcher car has the function of carrying a missile (or missile stage), erecting it into

* See Table 1, Appendix A, p. 22, below.

a launching position, and acting as the launching pad. This car also must provide a means of raising the missile into launching position and support while the missile is serviced. Such a procedure requires a lifting device or crane and a tower structure. The car also must provide for launching the missile -- which might require some type of outrigger device to stabilize the car during the launching period. Cars of this type could be produced in any of several plants, not normally producing rolling stock. These plants or shops might be used to produce the cars not only because the cars would require special production facilities but also because production in these plants would not interrupt the normal functioning of the plants manufacturing rolling stock. A further possibility is that a plant manufacturing rolling stock might produce the railroad car and still another plant might install the special equipment.